

Chapter Two: Contents

(Application to Portland – 15 October 2001 – LA-UR 01-5715 – Portland Study Reports)

Chapter Two—Application to Portland

The Emissions Estimator relies on the output of the Traffic Microsimulator and the network configuration for most of its input. However, the fleet distribution appropriate to the Portland area was constructed as part of the emissions task. In the case of Light-Duty Vehicles (LDV), the model requires the proportion of the fleet in each of the 23 subcategories.

The Comprehensive Modal Emission Model (CMEM) developers have provided tables that translate the fraction of gas-fueled vehicles in each model year from 1972 to 1997 into the various CMEM categories. They have a similar table to translate the fraction of light-duty, gas-fueled trucks into the various CMEM categories. Portland provided a Mobile5 run input that gives the fraction of the gas-fueled cars in each model year starting with the current year and extending back 25 years. The run also provides the equivalent data for gas-fueled, light-duty trucks less than 6000 pounds and gas-fueled, light-duty trucks with weights between 6000 and 8500 pounds. In addition, it gives the estimated vehicle miles traveled in each of the three categories: cars, trucks less than 6000 pounds, and trucks between 6000 and 8500 pounds. The latter information was used in two steps to estimate the fraction of the fleet in each CMEM category. The estimation was based on the assumption that the age distribution of the Mobile5 run for 2005 was representative of the age distribution for the years preceding 1996.

Table 1. Distribution of vehicles in Portland.

#	Vehicle Technology Category	Fraction
Normal Emitting Cars		Portland
1	No Catalyst	.0161
2	2-way Catalyst	.0323
3	3-way Catalyst, Carbureted	.0673
4	3-way Catalyst, FI,>50K miles, low power/weight	.1330
5	3-way Catalyst, FI,>50k miles, high power/weight	.1330
6	3-way Catalyst, FI,<50K miles, low power/weight	.0247
7	3-way Catalyst, FI,<50K miles, high power/weight	.0247
8	Tier 1, >50K miles, low power/weight	.0112
9	Tier 1, >50K miles, high power/weight	.0112
10	Tier 1, < 50K miles, low power/weight	.0676
11	Tier 1,<50K miles, high power/weight	.0676
Normal Emitting Trucks		
12	Pre-1979 (<=8500 GVW)	.0251
13	1979-1983(<=8500 GVW)	.0315
14	1984 to 1987(<=8500 GVW)	.0423
15	1988 to 1993, <=3750 LVW	.0461
16	1988 to 1993,>3750 LVW	.1062
17	Tier 1 LDT2/3 (3751-5750 LVW or Alt. LVW)	.0251
18	Tier 1 LDT4(6001-8500 GVW,>5750 Alt. LVW)	.0165
High Emitting Vehicles		
19	Runs lean	.0180
20	Runs rich	.0332
21	Misfire	.0410
22	Bad catalyst	.0138
23	Runs very rich	.0150

The Mobile5 output provides the distribution of heavy HDVs by model year. For our purposes, it was assumed that the Mobile5 run for 2005 could be used to represent the distribution of trucks and buses for the years previous to 1997. In other words, the fraction of trucks and buses that are one year old in 2005 is the same as it was in 1997. Aggregating into our multiyear groups, we obtained the weightings in Table 2.

Table 2. Representation of Heavy-duty vehicles in Portland.

Age class	Fraction of vehicle miles
Pre-1989	.34
1990-1993	.318
1994-1997	.342
Post - 1997	.0

For trucks, these weightings were used directly with the truck-age class emissions to define composite emissions for the truck fleet. In the case of buses, the weights were used with the bus emission classes for 1990-1993 and 1994-1997, but the truck emissions were used for the pre-1989 buses.

The evaporation model used the 2005 Portland age distribution of Light-duty Gas Vehicles and the sum of the Light-duty Gas Trucks 1 & 2, weighted by the fraction of total vehicle miles traveled for the three classifications to determine the age distribution

of cars and pickups and the car/pickup fraction for each year. The distribution of carbureted vehicles and the technology used in fuel injected vehicles for each year was obtained by using EPA tables for the national fleet. The determination of fraction of vehicles that passed the evaporative pressure and purge tests and the determination of the fraction of vehicles that were leakers used formulas provided by the EPA for their various evaporative emission models. Other than an average Reid Vapor Pressure (RVP) value for the fuel in Portland, no adjustment was made for gasoline characteristics.